ROANOKE COUNTY – SALEM JAIL
CAPITAL IMPROVEMENT PROJECT
PRIORITY LIST

16 September 2005
Project #10067

Roanoke County has requested a brief description, priority ranking and installed price be assigned for a list of items which represent only a portion of all improvements recommendations items described in HSMM's report to Roanoke County entitled "Engineering Systems Condition Assessment Study for Roanoke County-Salem Jail: Final Report" dated 11 July 2005.

This list of improvements recommendations is as follows:

- Remove condenser and cooling tower water pumps, reconfigure impellers, re-install pumps.
- Replace cooling tower and heat exchanger.
- Replace 11 critical heat pumps.
- Replace security control panel and relay cabinet.
- Replace intercommunication and paging system.
- Replace fire detection and alarm system with an addressable system.
- Replace CCTV systems with new color monitors, new cameras, digital video recorder capability and interconnection with intercommunication and paging sound systems.
- Replace remaining 12 heat pumps.
- Test and balance all air and water systems.

Based on HSMM's evaluation of the various existing systems plus current and anticipated future needs, HSMM recommends the above items be accomplished in the following order with estimated installed cost adjacent each item.

1. Replace cooling tower and heat exchanger. ($290,600)
2. Replace 11 critical heat pumps. ($255,974)
3. Replace remaining 12 heat pumps. ($149,106)
4. Remove condenser and cooling tower water pumps, reconfigure impellers, re-install pumps. ($13,387)
5. Test and balance all air and water systems. ($106,878)
6. Replace security control panel and relay cabinet. ($972,741)
7. Replace intercommunication and paging system. ($194,548)
8. Replace CCTV systems with new color monitors, new cameras, digital video recorder capability and interconnection with intercommunication and paging sound systems. ($778,193)
9. Replace fire detection and alarm system with an addressable system. ($119,719)

Total for above items: $2,881,146

Details pertaining to the above costs area addressed in Appendix B: "Probable Construction Cost Estimates" in the 11 July 2005 Study.

A description of each of the improvement recommendations and their benefits are as follows:

1. Replace Cooling Tower and Heat Exchanger:

The jail's water source heat pumps cool the various rooms they serve by absorbing heat from the rooms and rejecting the heat outside via water circulated from the heat pumps to and through the heat exchanger and cooling tower. The heat exchanger is in decent condition on its exterior, but its performance indicates its interior components are badly fouled. The cooling tower is in poor condition throughout with disintegrating components. Some disintegrated components have been cobbled together or replaced with non-factory type components. Both the heat exchanger and cooling tower could fail at any time and thus should be replaced immediately.

2. Replace 11 Critical Heat Pumps:

The heat pumps serving the jail are water source type heat pumps meaning they heat and cool rooms in the jail by absorbing or rejecting heat from a circulating loop of condenser water and exchanging that heat with room heat. The 11 units referenced here include HP-10, HP-13 through HP-16, and HP-18 through HP-23. HP-10 must be replaced soon as it is undersized. HP-15 and HP-16 are underperforming because they are near the end of their lives and/or because increased personnel and equipment heat dissipation compared to original design values for such when the jail was originally designed is overwhelming their capacity. HP-13 and HP-14 have developed pinhole leaks in their refrigerant coils. HP-18 through HP-23 also are underperforming plus their function is particularly critical in that they serve cell areas.

3. Replace Remaining 12 Heat Pumps:

These 12 heat pumps are water source type so their operation is identical to that described under item 2 above. The 12 units referenced here include HP-4 through HP-9, HP-11, HP-12, and HP-24 through HP-27. These units in general are in marginally better condition than the ones described under item 2 above. Per Roanoke County direction, there is no desire to replace the console heat pumps (HP-1, 2, 3, and 17) at this time.

4. Remove Condenser and Cooling Tower Water Pumps, Reconfigure Impellers, Re-install Pumps:

The condenser water pumps circulate water from the water source heat pumps to the heat exchanger, then back to the heat pumps. The heat exchanger absorbs heat from this condenser water then rejects this heat to a separate water loop: the cooling tower water loop. The cooling tower water pumps circulate water between the heat exchanger and the cooling tower. Both the condenser water and cooling tower water pumps are in reasonably good shape. However, the pumps must be removed and impellers switched or replaced once any of the heat pumps are replaced.

5. Test and Balance all Air and Water Systems:

It is doubtful that much if any existing HVAC equipment is operating at its originally intended air and water flows, particularly due to years of degradation, corrosion, and modification to the existing equipment. Furthermore, even if all equipment were operating to capacities originally indicated in original design documents, the increased jail population and increased use of heat producing equipment such as personal computers, dictates that much of original HVAC equipment is undersized and should be replaced based on this requirement alone. Therefore, it is recommended that testing and balancing of the HVAC systems wait until all existing equipment is replaced. Then the jail will not only have new, properly sized equipment, but also an assurance through a complete air and water side testing and balancing report that all systems are delivering air and water flows as intended.

6. Replace Security Control Panel and Relay Cabinet:

Install a more modern electronically controlled programmable security control system for added reliability and easier operation. The central and area control panels will be installed for operation of existing door operators. These control panels will tie into a central computerized programmable system. This system can also be connected for operation of the intercommunication and paging system and the closed circuit television system. We recommend the installation as a complete system for maximum advantages of the ease of utilization of the system. The relay cabinet will be replaced by a much smaller and less complicated unit. The computer system would take care of the interconnection and interlocking via programming in place of the hard wiring and relays. Touch screen type control panel(s) will be installed in the central control room. Either touch screen or smooth membrane panel type control panels will be located in the cell groups for local control. This local panel will have the ability to control doors, intercom, and lighting in the respective cell group that it overlooks. The central control panel(s) will control the complete facility including having the ability to take over the local panels. Interconnection of systems will provide a much easier operation in that a single operation of a touch can enable the intercom, trigger the proper camera and setting, and operate a door. The interconnect operation will help assure the operator is observing the correct location, minimizing operating time, and assuring that all operations are recorded. We feel that much of the existing wiring can be reused to help the cost.

7. Replace Intercommunication and Paging System:

The intercommunication and paging system will be replaced by a newer more selective and reliable system. The conduit and device boxes will be reused where possible. The electronics including all controls, call stations, speakers, and cabling will be replaced. The intercom will allow direct voice communication with the individual call stations and the paging will allow communication via speakers to pre-programmed areas such as a single cell group to all cell groups to the entire facility.

8. Replace CCTV Systems with New Color Monitors, New Cameras, Digital Video Recorder Capability and Interconnection with Intercommunication and Paging Sound Systems:

The installation of a single Closed Circuit Television System (CCTV) will provide a much more automatic user friendly system allowing for smoother more efficient operation of the facility controls. The CCTV system will have a primary monitor that will act as the operator's main eyes during facility operation. Any time an intercom or door is operated, the nearest camera will automatically go to this location and the image will be displayed on this primary monitor. There will also be a secondary monitor that is next in line when the primary is tired up with an operation and then at least four additional monitors that can be programmed to watch one or more strategic locations or cycle through any number of cameras for preset periods of time. The system can be color or monochrome (black and white) with the color costing more. There is also a possibility of reusing some of the newer existing cameras.

9. Replace Fire Detection and Alarm System with an Addressable System:

A complete new addressable fire detection and alarm system will be installed throughout the entire facility. Existing conduits and boxes can be reused in many locations. The addressable system will provide a more reliable system in that it will be able to pinpoint any problem locations with the system operation and will provide the exact location of any alarm. Each alarm initiating and signaling device has an address or name and, therefore, will signal the system with the exact location of any alarm or problem. Addressable systems are the standard type being installed at this time.